

REMARKS

Claims 27, 33, 38, and 39 have been amended. No new matter has been introduced. Claim 40 has been canceled. Claims 1-17, 31 and 32 have been withdrawn. Claims 21, 27, 33, 36-39, 41, and 47-55 are pending.

Claims 21, 27, 33, 37-40, 47-50, and 53-55 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 6,188,094 (Kochi). Applicant respectfully traverses the rejection.

The present invention relates to a light detecting system. Accordingly, independent claim 21 recites “a light detecting system comprising: a substrate having a plurality of photosensitive regions; and a substantially planar microlens array formed over said plurality of photosensitive regions.” Claim 21 further recites the microlens array including “a first light conductor having a plurality of concave recesses, and a second light conductor within each recess and over a planar surface of said first light conductor.”

Independent claim 27, as amended, recites “an integrated circuit comprising a substrate having a plurality of photosensitive regions; and a substantially planar microlens array formed over said plurality of photosensitive regions; said microlens array comprising; a first light conductor having a plurality of concave recesses, a second light conductor within each recess and over said first light conductor, said second light conductor being coextensive with an adjacent second light conductor in at least a first plane, and readout circuitry coupled to said plurality of photosensitive regions.”

Independent claim 33, as amended, recites a “method of forming an imaging device, said method comprising: providing a substrate having a plurality of photosensitive regions; and forming an array of microlenses, the array including a respective microlens over each of said plurality of photosensitive regions by: depositing a first light conductor precursor, etching said first light conductor precursor to create a first light conductor having concave recesses over each of said photosensitive regions such that each concave recess contacts an adjacent concave recess; and forming a second light conductor within each concave recess such that said second light conductor is coextensive with an adjacent second light conductor.”

Kochi relates to a solid-state image pickup device. (Title). Kochi fails to disclose, teach, or suggest “a substantially planar microlens array formed over said plurality of photosensitive regions; said microlens array comprising . . . a second light conductor within each recess and over a planar surface of [a] first light conductor,” as recited in independent claim 21. An advantage of the microlens array of the FIG. 4 exemplary embodiment of the invention is to decrease the amount of cross talk between pixel cells. The amount of cross talk is reduced by providing a second light conductor over a planar surface of a first light conductor. The second light conductor reduces the amount of light entering the planar surface of the light conductor, and thereby limiting the amount of unguided light that travels through the microlens array. *See* paragraph [0028] of the Applicant’s application (“the ‘222 application”). Kochi does not address the problem of cross talk, much less disclose, teach, or suggest a way of reducing cross talk.

For at least this reason, Applicant respectfully submits that claim 21 is allowable over Kochi. Claims 47-52 depend from claim 21 and are allowable along with claim 21 and on their own merit. For example, dependent claim 52 recites “[t]he light detecting system of claim 21, wherein a portion of said second light conductor over said planar surface of said first light conductor has a thickness approximately equal to $\lambda/2 * N$, wherein λ refers to a particular wavelength of light entering said microlens, and N refers to an index of refraction associated with said second light conductor.” The portion of the second light conductor over a planar surface of the first light conductor decreases cross talk between pixel cells by spectral reflectance. *See* paragraphs [0027]-[0028] of the ‘222 application. As discussed above, with respect to claim 21, Kochi fails to address the problem of cross talk; therefore, Kochi fails to disclose, teach, or suggest each and every limitation of claims 21 and 47-52.

Kochi similarly fails to disclose, teach, or suggest an integrated circuit having a substantially planar microlens array comprising “a first light conductor having a plurality of concave recesses [and] a second light conductor within each recess and over [the] first light conductor, [the] second light conductor being coextensive with an adjacent second light conductor in at least a first plane,” as recited in claim 27. The FIG. 10 exemplary embodiment of the invention minimizes the amount of light reflected, while focusing the light onto respective

photosensitive regions. *See* paragraph [0048] of the '222 application. Kochi does not address light reflection, much less disclose, teach, or suggest a way of minimizing reflection.

For at least this reason, Applicant respectfully submits that claim 27 is allowable over Kochi. Claims 53-55 depend from claim 27 and are allowable along with claim 27 and on their own merit.

Kochi fails to disclose, teach, or suggest a method of forming an imaging device by “depositing a first light conductor precursor, etching [the] first light conductor precursor to create a first light conductor having concave recesses over each of [the] photosensitive regions such that each concave recess contacts an adjacent concave recess; and forming a second light conductor within each concave recess such that [the] second light conductor is coextensive with an adjacent second light conductor,” as recited in claim 33.

The Office Action’s assertion (at p. 3) that Kochi “discloses the array of concave recesses is formed by chemical etching,” is misplaced. The cited portion of Kochi for the Office Action’s assertion (col. 5, lines 13-17) states that “the upper surface is leveled by polishing the entire surface by CMP (Chemical Mechanical Polishing).” Kochi at col. 5:13-17 (emphasis added). CMP is not the same as chemical etching; CMP is typically used to planarize or “level” a material layer. Accordingly, Kochi’s FIG. 4C is leveled to arrive at Kochi’s FIG. 4D. Kochi does not disclose, teach, or suggest “etching [the] first light conductor precursor to create a first light conductor having concave recesses over each of [the] photosensitive regions such that [the] concave recess contacts an adjacent concave recess,” as recited in claim 33.

For at least this reason, Applicant respectfully submits that claim 33 is allowable over Kochi. Claims 36-41 depend from claim 33 and are allowable along with claim 33 and on their own merit.

Claims 36 and 51 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Kochi in view of the Acknowledged Prior Art (APA). Applicant respectfully traverses the rejection.

As discussed above, Kochi fails to disclose, teach, or suggest each and every limitation of claims 21 and 33. Accordingly, claims 36 and 51 are allowable over the combination of Kochi and APA.

Claim 41 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Kochi in view of U.S. Publication No. 2001/0035551 (Kotecki). Applicant respectfully traverses the rejection.

Courts have generally recognized that a showing of a *prima facie* case of obviousness necessitates three requirements: (i) some suggestion or motivation, either in the references themselves or in the knowledge of a person of ordinary skill in the art, to modify the reference or combine the reference teachings; (ii) a reasonable expectation of success; and (iii) the prior art references must teach or suggest all claim limitations. *See e.g., In re Dembiczak*, 175 F.3d 994 (Fed. Cir. 1999); *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998); *Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 1573 (Fed. Cir. 1996); and MPEP §§ 706.02(j) and 2143 *et seq.* Furthermore, the “[t]he teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant’s disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).” MPEP §706.02(j).

Applicant respectfully submits that Kochi and Kotecki are not properly combinable. Kotecki relates to a method of fabricating a stack capacitor DRAM. (Title). Kotecki further states that vias 44 (of Kotecki’s FIG. 4) can be formed by reactive ion etching. As discussed above, Kochi relates to a solid-state image pickup device.

Specifically, Kochi relates to deposition of a first interlayer layer 14 over conductive layer 13. *See Kochi* at col. 4:60-67. The deposition of the first interlayer layer 14 over the conductive layer 13 results in a concave surface. *See id.* A second interlayer layer 15 is subsequently deposited onto the first interlayer layer 14; the second interlayer layer 15 conforms to the shape of the underlying first interlayer layer 14. *See id.* at col. 5:1-12; *see also* FIGS. 4B-4D. Kochi’s entire FIG. 4C structure is then planarized (or leveled) to arrive at the FIG. 4D structure. Because the first interlayer layer 14 is formed over the conductive layer 13, and the first interlayer layer 14 takes on a shape having concave surfaces, there is no need to etch the

first interlayer layer 14, as the Office Action asserts (in combining Kotecki with Kochi). Accordingly, Kochi and Kotecki are not properly combinable; indeed, Kochi teaches away from etching the first and second interlayer layers 14, 15, by depositing both layers over conductive layers 13.

Even if the references were combinable, which they are not, neither Kochi nor Kotecki disclose, teach, or suggest each and every limitation of claim 33 (from which claim 41 depends), as discussed above. Accordingly, Applicant respectfully submits that claim 41 is allowable over Kochi and Kotecki.

Claim 52 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Kochi. Applicant respectfully traverses the rejection.

As discussed above with respect to claim 21, Kochi fails to disclose, teach, or suggest suggest “a substantially planar microlens array formed over said plurality of photosensitive regions; said microlens array comprising . . . a second light conductor within each recess and over a planar surface of [a] first light conductor,” as recited in independent claim 21. Accordingly, it would not have been obvious to one having ordinary skill in the art at the time the invention was made to have a portion of the second light conductor having the claimed thickness, as the portion referred to by the Office Action is neither disclosed nor taught by Kochi.

For at least this reason, Applicant respectfully submits that claim 52 is allowable over Kochi.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

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Respectfully submitted,

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